USER MANUAL: FREESKIES COPILOT BETA V1.0 BUILD 11

By:

FreeSkies

JULY 27, 2015

FREESKIES

Contents

1. Overview of App 2
2. Select Mission Screen 2
3. Creating and Editing Missions 2
4. Playing Back Missions 6
5. Saving and Starting Missions 7
6. Preflight Checklist 8
7. Getting in the Air 10
8. Flight Status Messages and Their Meanings 12
9. Compass Calibration 12
10. IMU Calibration 13
11. Playing Back Your Recorded Video 15
12. Troubleshooting 15

1. Overview of App

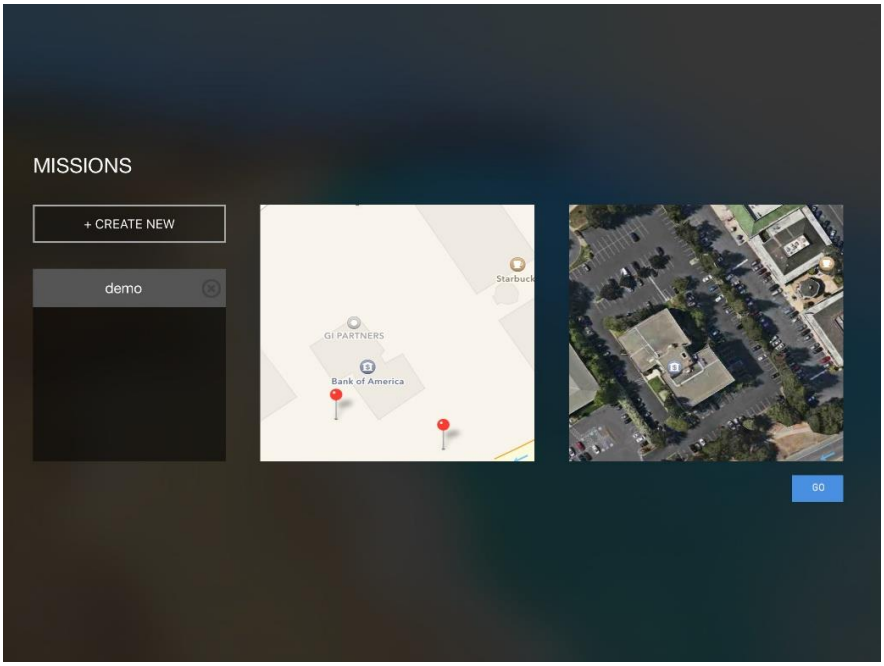
FreeSkies CoPilot is a mobile application designed to help you capture amazing aerial footage autonomously. With CoPilot, you can previsualize and create your drone flight in 3D, anywhere, anytime. When you're ready to fly, CoPilot will guide you through the essential steps to ensure your drone flight is safe and successful. When you're ready, just tap Start Mission, and let CoPilot take it from here!

NOTE: When using CoPilot with the DJI Inspire dual controller setup, the slave controller (Gimbal Control) is not fully functional. The video feed does not show and there is a significant delay in the first person video on the Master Controller. Therefore, we ask that you only use the CoPilot application with the master controller for now. You will have the same control with the Inspire as you do with the Phantom 3 Pro.

2. Select Mission Screen

On entering the CoPilot application, you will be taken to a mission selection screen (Figure 1). On the left side of the screen, you have options to either create a new autonomous flight path or select one that you have previously designed and saved.

Figure 1: Select Mission Screen



Upon selection of a pre-saved path, two maps will appear. The first map (on the left) is a top-down, 2D overview of the path. The second map (on the right) is an overview of your path in 3D. If this is your first time using CoPilot, "Create New" path.

3. Creating and Editing Missions

If this is your first mission, you will be shown tutorial graphics (Figures 2 and 3) on how to operate the 3D interface.

Figure 2: 3D Map Tutorial: Rotation

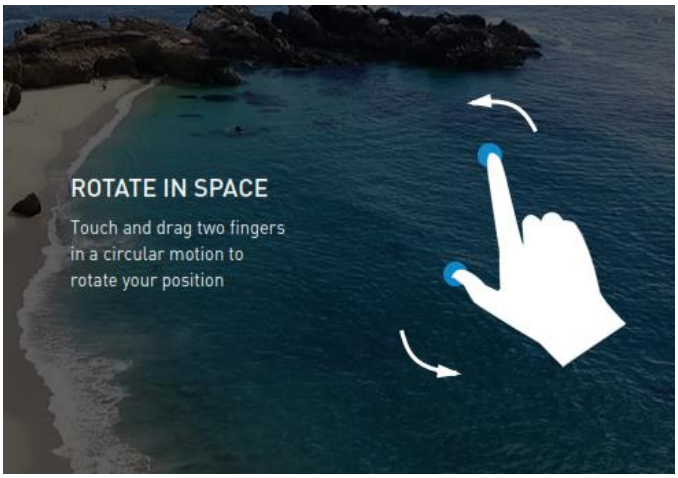
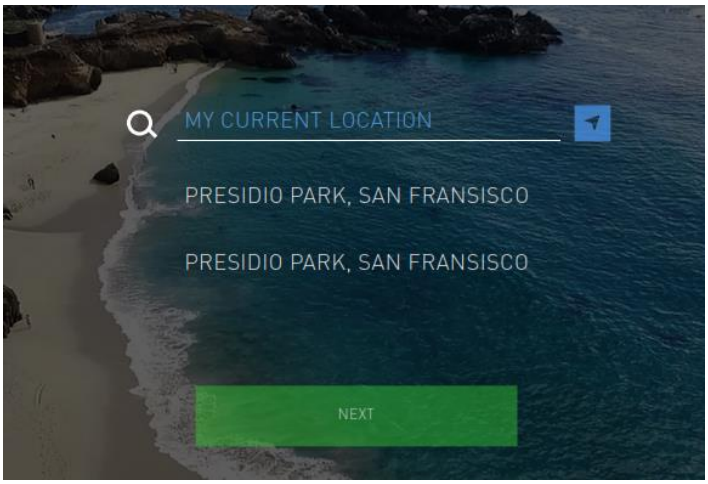


Figure 3: 3D Map Tutorial: Tilt

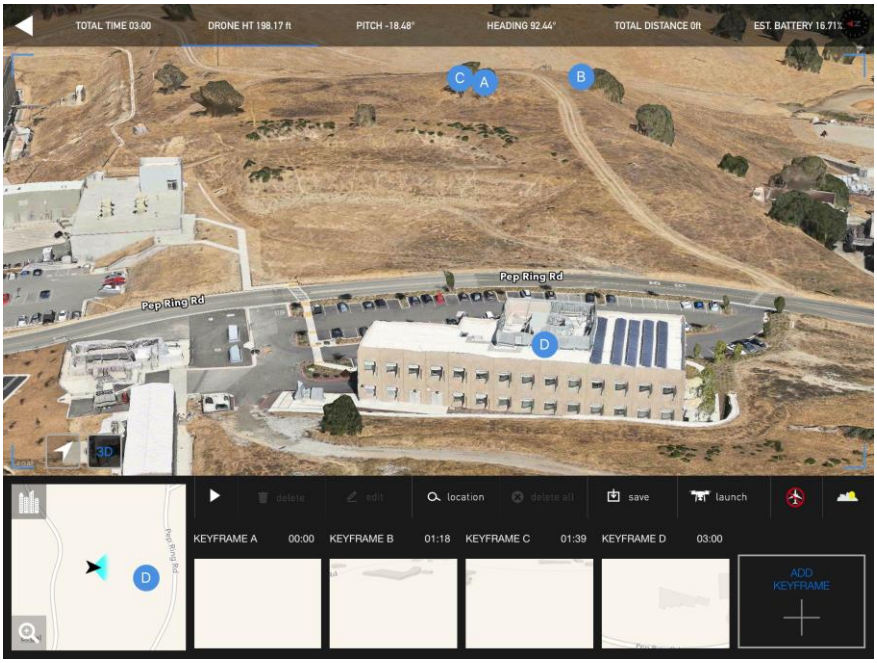
After the tutorial graphics, you will be taken to a screen where you can set the location for your flight (Figure 4). On this screen, you are given the option to type in your desired location or use your current location.

Figure 4: Location Search



Once you have selected your mission location, you will be taken to the mission planning screen (Figure 5), where you can previsualize and plan out your autonomous flight path.

Figure 5: Create Mission



In the top information bar, you will find the **Estimated Total Time**, **Drone Height**, **Gimbal Pitch**, **Aircraft Heading**, **Total Distance**, and **Estimated Battery Usage** for your mission.

To add waypoints for your flight path:

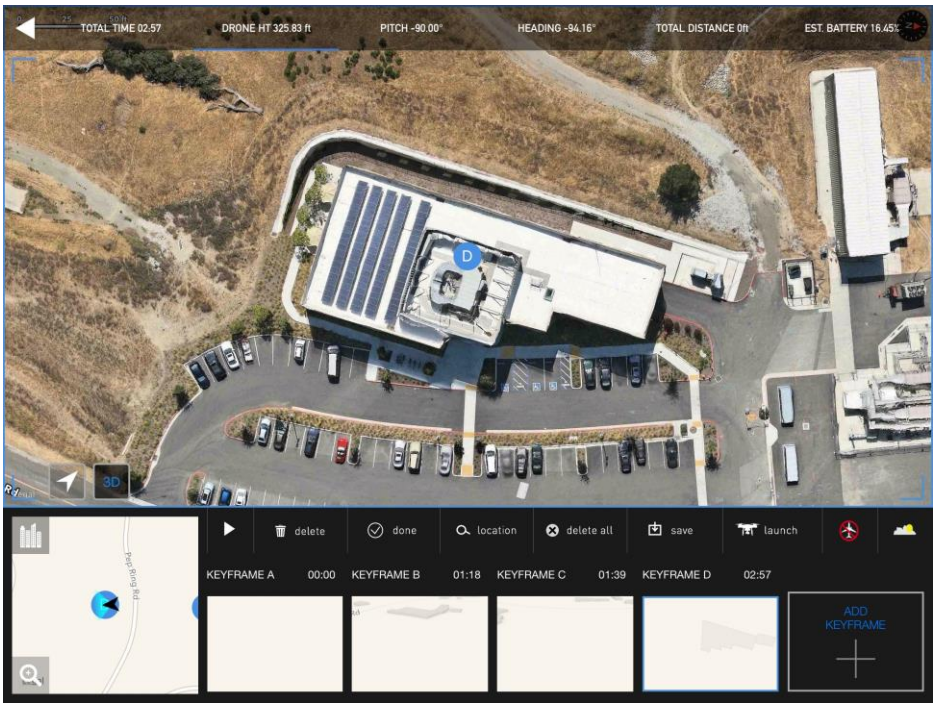
- You can choose to use your current location or change to a different location by tapping the “location” button on the bar above the keyframes
- Use the 3D map interface to find the shot that you want the drone to capture
- Tap on the button titled “ADD KEYFRAME” on the bottom bar

- Do this for the various shots you want to capture
- Above each saved keyframe in the bottom bar, the mission time at that waypoint will be shown in a minutes and seconds format.
- The application will generate a flight path to capture the specified shots in the order you saved them
- A 2D map is provided in the bottom left corner of the mission planning screen to help visualize the full flight path of the drone.
- Anytime a key mission parameter is exceeded, the app will notify you by turning that parameter red in the top information bar.
- If you do not have access to 3D maps and/or wish to manually set altitude at each waypoint, you can tap on the corresponding keyframe and then on the "Drone Ht.", type in the value you wish to set for the altitude.
    - **NOTE:** Using the application by manually inputting altitude is extremely risky and we do not recommend doing so without having a detailed understanding of the environment you are operating in.
    - This method has not been tested in all environments. We encourage you to exercise caution and use this feature at your own risk.
    - When using the top down view to set waypoints and manually input altitude, switch the flight mode from "Auto" to "Manual" before flying, which allows you to manual point the camera while the drone is following its autonomous point-to-point path.

To edit the waypoints you have created (Figure 6):

- Select the keyframe in the bottom bar
- Click on "edit" in the bar above the keyframes and adjust the view in the 3D interface
- You also have the option to "delete" each keyframe and "delete all" keyframes in the same bar

Figure 6: Edit Mission



Throughout the mission planning stages, we offer in app ability to check the current weather forecast and a map of restricted airspaces via the weather and no fly zone icons (Figures 7 and 8 respectively). We strongly encourage you to check both of these before any flights to gain a better understanding of the environment your drone will be flying into.

Figure 7: Weather Icon

Figure 8: No Fly Zones

4. Playing Back Missions

Throughout the mission planning stage, you have the ability to playback your mission from start to finish. This feature helps you previsualize how your drone will fly through your created path and capture the keyframes you have selected.

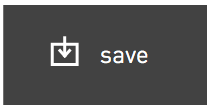
Figure 9: Play Button

To enter playback, hit the play button (Figure 9) on the select mission screen. Please note, it may take a few seconds before you notice any changes. Please be patient. During playback, you have the option to pause and make any adjustments necessary to the keyframes.

5. Saving and Starting Missions

When you have the flight path designed to your liking, you can save the path by hitting the “save” button (Figure 10).

Figure 10: Save Mission



You will be taken to a screen (Figure 12) where you can enter a name for your mission and review the key parameters of your flight path. After saving your mission, you will be taken back to the mission planning screen, where you can choose to go into the flight menu by hitting “launch” (Figure 11). You can also return to the select mission screen by hitting the back button in the upper left corner of the screen.

Figure 11: Launch Mission

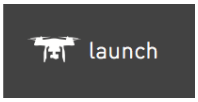
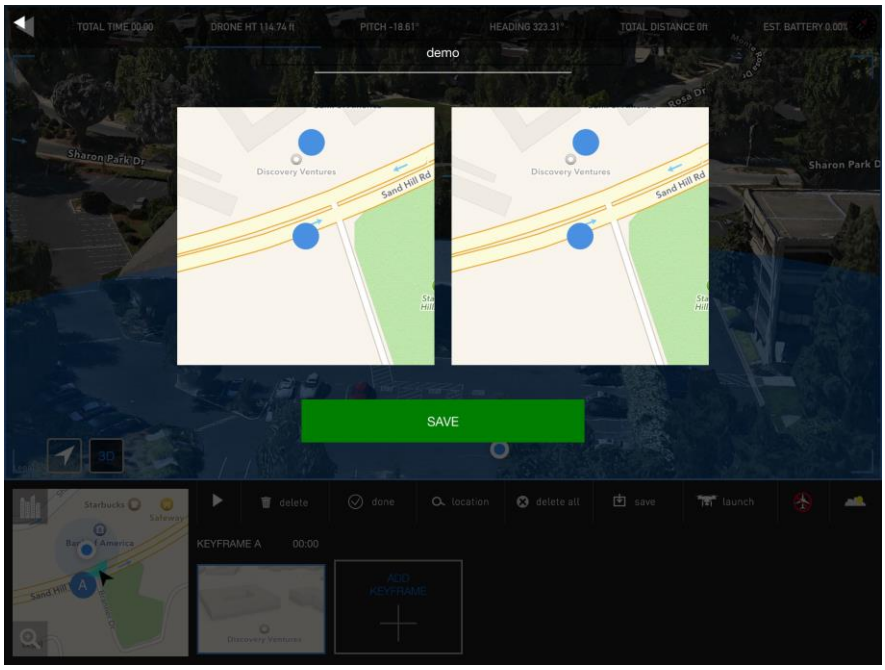


Figure 12: Save Mission



6. Preflight Checklist

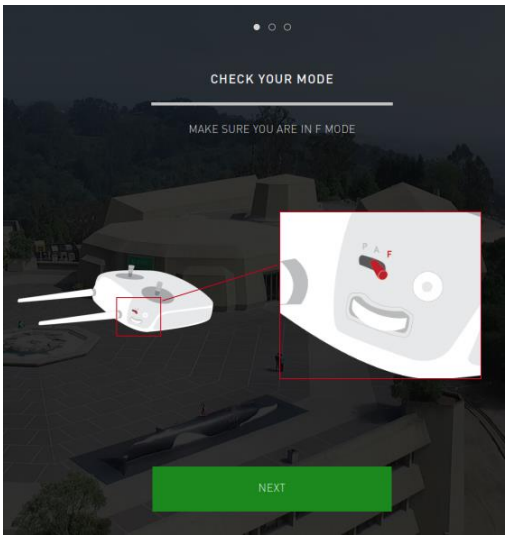
Before moving onto the flight menu and preflight checklist, go into the DJI Pilot app to ensure that the IMU and compass are properly calibrated and functioning as well as to ensure that the aircraft is safe to fly. Instructions for checking the Compass and IMU calibrations are given in Sections 8 and 9, respectively, in this document.

When you enter the flight menu (see Section 7 for more information), tap on the play button at the bottom of the screen to begin the preflight checklist. This takes you through the essential steps to ensure a safe and successful flight.

NOTE: Your drone and remote controller must both be ON before entering the preflight checklist.

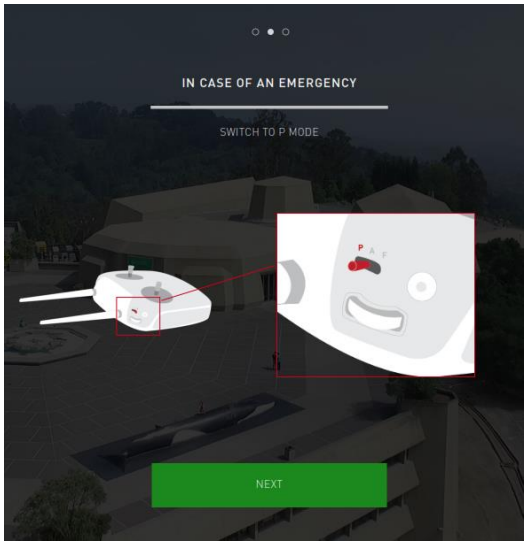
The first card (Figure 13) asks you to switch your controller into F mode. This allows the CoPilot application to communicate with the drone through the controller.

Figure 13: Preflight 1



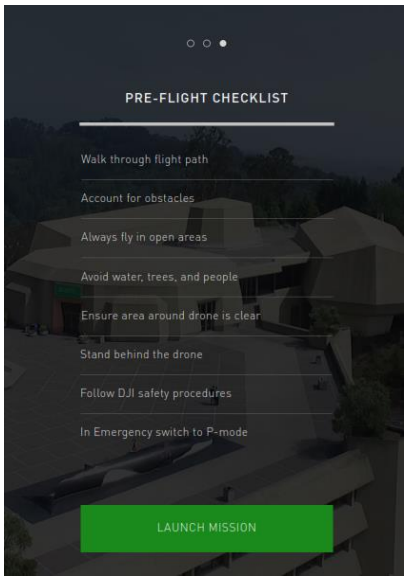
The next card (Figure 14) shows you how to switch the controller out of autonomous mode in the case of emergency. Switching the controller out of F mode and into P mode anytime during flight will cut the autonomous code and stabilize the drone, returning GPS assisted manual control to the user.

Figure 14: Emergency Precaution



The final card (Figure 15) is a list of steps to follow before launching your mission. We recommend that you follow all of these precautions to ensure a safe and successful flight for you and others around you. We also recommend you read through the DJI Safety Manual (Provided on the FreeSkies Forums). When you hit “Next”, the mission will be uploaded to the drone. You will receive a notification when it is successful.

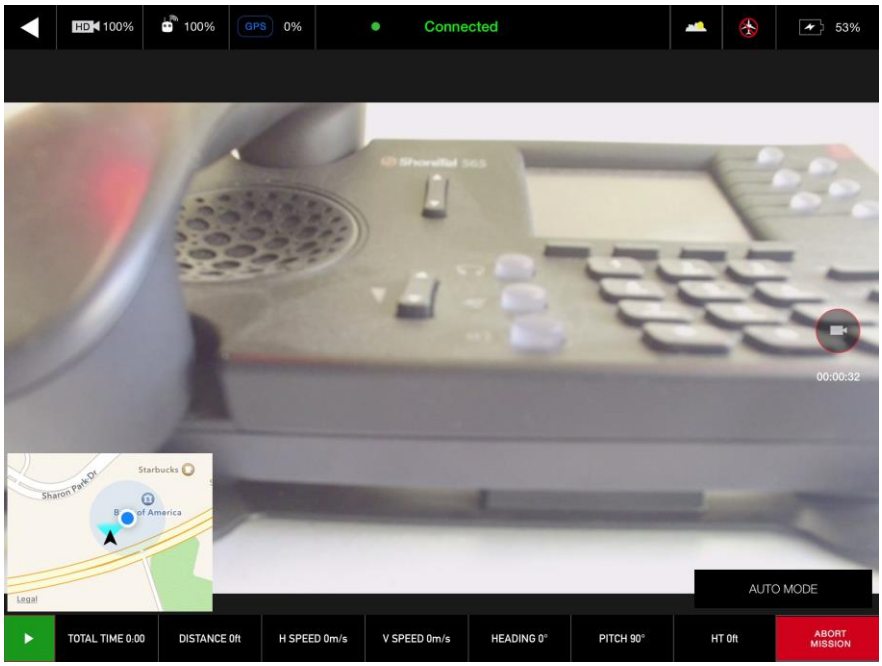
Figure 15: Final Checklist


PRE-FLIGHT CHECKLIST
Walk through flight path
Account for obstacles
Always fly in open areas
Avoid water, trees, and people
Ensure area around drone is clear
Stand behind the drone
Follow DJI safety procedures
In Emergency switch to P-mode
LAUNCH MISSION

7. Getting in the Air

When you've completed the Preflight checklist, you will be taken back to the flight screen (Figure 16), where you have a first person view of the drone's camera, as well as the ability to record video throughout the mission. The top bar includes all pertinent flight status information, such as **Video Quality**, **Remote Controller Signal Strength**, **GPS Status**, and **Battery Capacity Remaining** as well as the ability to check the weather and no-fly zones. In the center of the top bar, the controller to mobile device connection status is displayed and this bar updates with the aircraft status (Section 8). The quality of the Video and the strength of the controller are shown as percentages for the Beta. The GPS Status icon will turn green when the drone has GPS lock and the number portrayed next to the icon is the number of GPS satellites acquired by the drone. On the bottom bar, the **Total Time, Distance** (from home point)**, Horizontal Speed, Vertical Speed, Aircraft Heading, Gimbal Pitch,** and **Drone Height** in flight are displayed.

Figure 16: Flight Screen



Please check your flight path to ensure there are no unexpected obstacles and be sure to check the no fly zones and weather before flying. When you're ready to fly, press launch and enjoy your flight!

When you hit launch, the drone will autonomously takeoff, execute the mission, and return home and land. **NOTE:** Please ensure your surroundings are clear before hitting the launch button.

The "AUTO" button on the bottom right of the screen indicates that the flight mode of the drone is fully autonomous, matching the path and camera position. Tapping this button will switch the drone to a Semi-Autonomous mode where the drone will autonomously fly to the locations specified while giving you full manual control of the camera angle and direction. Think of this as an extended cable camera. **NOTE:** You must choose Auto or Manual Mode before you fly as this setting cannot be changed in air.

You may start and stop the video recording at any time during the flight by pressing the icon on the right side of the screen.

If your landing is off course, you can correct it during the return home sequence with manual inputs on the remote controller, however it is recommended that you cut the autonomous code and manually land the aircraft if necessary to ensure the most stability during the landing procedure.

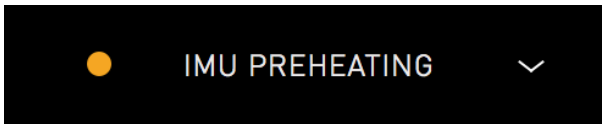
In case of any emergency or unexpected flight occurrence, we **strongly** advise switching the controller **into P mode** to regain manual control. If this is not possible, pressing the Abort Mission button on the flight screen will also cut the autonomous code and allow you to regain full manual control of the drone.

8. Flight Status Messages and Their Meanings

When in the flight screen, the CoPilot Application will notify you of the aircraft status in the center of the top information bar. When the drone is connected to the controller, the center message will read “Connected.” If there is a connection error, the message will read “Disconnected.” In addition to these messages, the application will also give you an update on the IMU and Compass status using the following messages.

Before every flight, the IMU (inertial measurement unit) must warm up, and the app will notify you of the progress via the status bar with the status bar being lit yellow (Figure 17).

Figure 17: IMU Preheating

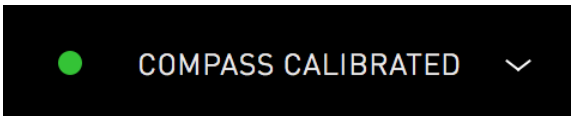


The app will automatically detect a compass error and notify you to calibrate the compass (Figure 18), the steps for which are provided in Section 9.

Figure 18: Compass Error

Upon successful compass calibration, the flight status bar will notify you (Figure 19).

Figure 19: Compass Calibrated



Unfortunately, we currently cannot show the IMU calibration status in the CoPilot app. We are currently working to resolve this issue and have provided intermediary steps to ensure a properly calibrated IMU in Section 10.

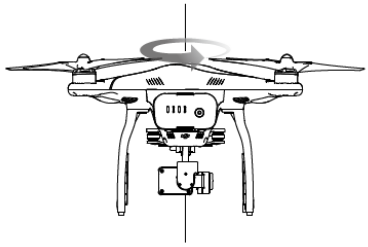
9. Compass Calibration

The steps to calibrating the compass are provided below for reference (Via the DJI Wiki). For the Beta version of the CoPilot app, all compass calibration functions will be managed through the DJI Pilot App.

1. In the DJI Pilot App, tap the Aircraft Status Bar in the app and select “Calibrate”, then follow the on-screen instructions.

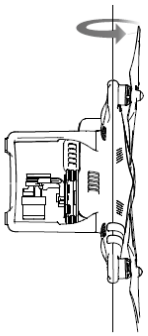
2. The first step will be to hold the aircraft horizontally (Figure 20) and rotate 360 degrees. The Aircraft Status Indicators will display a solid green light.

Figure 20: Compass Calibration 1



3. The next step will be to hold the aircraft vertically (Figure 21), with nose pointing downward, and rotate it 360 degrees around the center axis. Recalibrate the compass if the Aircraft Status Indicator glows solid red after doing this.

Figure 21: Compass Calibration 2



Warning:

If the Aircraft Status Indicator blinks red and yellow after the calibration procedure, move your aircraft to a different location and try again.

Tips:

Calibrate the compass before each flight. Launch the DJI Pilot app and follow the on-screen instructions to calibrate the compass. DO NOT calibrate the compass near metal objects such as a metal bridge, cars, and scaffolding.

10. IMU Calibration

As mentioned in Section 8, we unfortunately do not support IMU calibration in the CoPilot Beta Application at this time.

This section is meant to provide intermediary steps using the DJI Pilot app to ensure your drone's IMU is properly calibrated before any flights. An improperly calibrated IMU can cause severely unstable flight and can occasionally result in aircraft failure.

To check the calibration of the IMU (Figure 22 and 23):

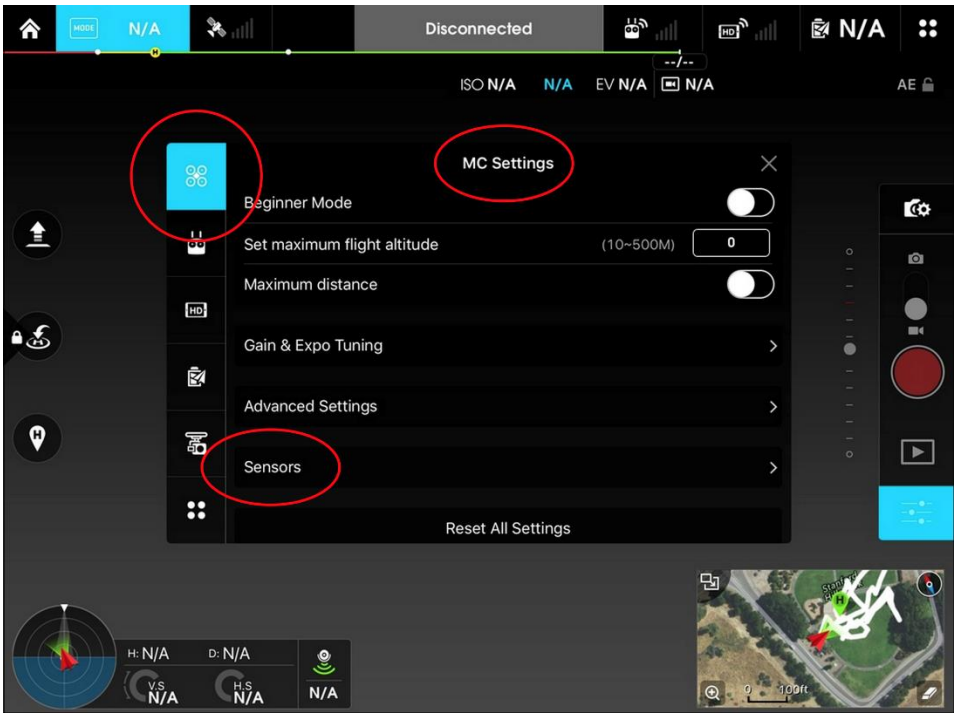
- Turn on the Remote Controller, Phantom and tablet/phone. Connect the remote control ler to the tablet/smartphone with the appropriate cable.
- Enter the Pilot App and navigate to the IMU calibration page by going to: DJI Pilot app >Camera> MC Settings > Sensors (Figure 22)
- The acceleration Mod value in the list of settings should be between 0.99 and 1.1
- If the Mod value is not within this range, it is strongly recommended to do an IMU calibration

To conduct the IMU calibration:

- First, make sure the drone has had enough time to cool down after flying. (It is recommended to do a necessary IMU calibration before the first flight of a day of flying)
- Place the drone on a level surface. It is recommended to use a level tool to check that the surface is perfectly level
- Turn on the drone, remote controller, and open the DJI pilot app on your phone
- Navigate to DJI Pilot app>Camera> MC Settings > Sensors > IMU calibration
- Click on IMU Calibration, and click through the message and warning screens.
- The IMU Calibration will take 3-10 minutes - Notification messages will pop up as the calibration progresses. Ensure you get an IMU Calibration complete message before continuing.

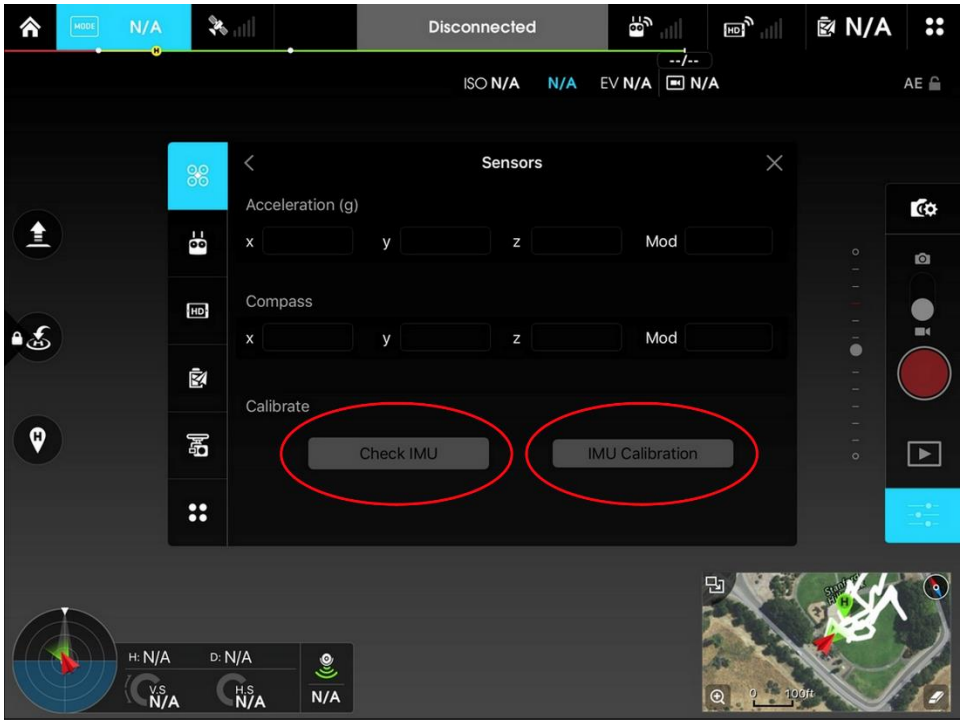
NOTE: If you are experiencing long IMU preheating times, it is recommended to do an IMU Calibration after allowing the drone to cool down fully.

Figure 22: IMU Calibration 1



Source: Phantom Pilots

Figure 23: IMU Calibration 2



Source: Phantom Pilots

11. Playing Back Your Recorded Video

CoPilot currently does not have the ability to playback recorded mission videos in app. We are working on releasing this feature in our next beta update.

For this version of the beta, you will be able to access the video you record during flight through the DJI Pilot application.

Instructions on how to do this are as follows:

1. Leave or turn your drone and controller on
2. Open the DJI Pilot app on your device
3. Click on camera to enter the flight screen
4. Press on the Play icon on the right hand side of the screen, located just under the camera record button
5. A screen will pop-up with your most recent video
6. Press play on this screen to view your video

12. Troubleshooting

CoPilot Application Not Connecting

If you are experiencing connection issues between the application and your remote controller, please check that you are running the correct firmware on your drone and remote controller and have the remote controller switched into “F-mode.” If this does not resolve your issue, please check our Beta Support Forum or send us an email at info@freeskies.org.

Unexpected Flight Behavior
If there is ever any unexpected occurrence during your flight, the BEST practice is to switch your controller into P mode. This will cut the autonomous code and allow you to take manual, gps-assisted control of your drone.

Slow Response Times
If you find that the app is slow to respond or it keeps crashing during heavy use, we ask that you please operate the app with patience and allow each process to load fully before proceeding.

Inaccurate Autonomous Landing
If you find that the autonomous return home and landing is off course, you do have the ability to correct it during the return home sequence with manual inputs on the remote controller. However it is recommended that you cut the autonomous code and manually land the aircraft if necessary to ensure the most stability during the landing procedure.

Unknown and Unresolved Issues
If you have any questions, comments, or concerns, please check out the FAQ page or post on the Drone Center.